

INCH-POUND

PD-53048

16 June 1997

PURCHASE DESCRIPTION
TANK, FABRIC, COLLAPSIBLE; SELF-SUPPORTING,
OPEN TOP, WATER STORAGE, 3000 GALLONS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers fabric, collapsible, self-supporting, 3000 gallon tanks for storage of potable water.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-Automotive and Armaments Command, Mobility Technology Center, ATTN: AMSTA-RBWH, Fort Belvoir, VA 22060-5843 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5430

Distribution Statement A. Approved for public release, distribution is unlimited.

SPECIFICATIONS

FEDERAL

- PD-52255 - Repair Kit and Repair Kit Components for Collapsible Fabric Tanks, Drums, and Boats.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

FOOD AND DRUG ADMINISTRATION (FDA)

- 21 CFR - Food and Drugs, Parts 170-199

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

- AATCC 111 - Weather Resistance of Textiles: Sunshine Arc Lamp Exposure with Wetting

(Application for copies should be addressed to the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.)

AMERICAN PUBLIC HEALTH ASSOCIATION, INC. (APHA)

Standard Methods for The Examination of Water and Waste Water

- Part 207 - Odor

- Part 211B - Taste

(Application for copies should be addressed to the American Public Health Association, Inc., 1015 18th St. NW, Washington, DC 20036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D 413 - Standard Test Methods for Rubber Property - Adhesion to Flexible Substrate

- ASTM D 471 - Standard Test Method for Rubber Property - Effect of Liquids

- ASTM D 751 - Standard Test Methods for Coated Fabrics
- ASTM D 1149 - Standard Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber
- ASTM D 1171 - Standard Test Method for Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
- ASTM D 2565 - Standard Practice for Operating Xenon Arc - Type Light-Exposure Apparatus With and Without Water for Exposure of Plastics
- ASTM D 3787 - Standard Test Method for Bursting Strength of Knitted Goods - Constant-Rate-of-Traverse (CRT) Ball Burst Test.
- ASTM F 1122 - Standard Specification for Quick Disconnect Couplings.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia PA 19103.)

NATIONAL SANITATION FOUNDATION (NSF)

- Standard 61 - Drinking Water System Components - Health Effects

(Application for copies should be addressed to the National Sanitation Foundation, 3475 Plymouth Rd., P. O. Box 1468, Ann Arbor, MI 48106)

AMERICAN NATIONAL STANDARD INSTITUTE

- ANSI/ASQC Z1.4 - Sampling Procedures and Tables for Inspection by Attributes.

(Application for copies should be addressed to the American National Standards Institute, 11 W. 42nd Street, New York, NY 10036.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The tank shall be an open-top, storage container capable of holding and dispensing 3000 gallons of potable water. The upper portion of the tank shall have a circular collar or lip, to prevent spillage, filled with either air or a buoyant material such as Styrofoam or kapok. If air is used, a pump shall be provided with the tank. A closely fitted protective cover for the tank shall be provided. The cover shall fasten to the tank securely by plastic toggles and loops, and shall be supported, to prevent the accumulation of precipitation. The tank shall be equipped with one male and one female standard, quick-disconnect fitting as specified in 3.4.3. The fittings shall be located near the bottom of the tank so that the fittings are accessible when the tank is filled to rated capacity. A reinforcing pad shall be bonded to the tank surrounding the fitting connections to support the fitting to the tank fabric. A valise shall be provided for carrying the tank and accessories. The valise may be the cover or ground cloth that is fitted with handles and closures, with folding instructions for use as the valise. No part of the tank interior or cover shall have a detrimental effect on potable water. The tank, cover, ground cloth, fittings,

and valise shall approximate either a matte sand or flat black color (see 6.2). Each tank shall be provided with two valve assemblies.

3.2 First article. Unless otherwise specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.3 Materials. Tanks shall be produced from materials that meet or exceed the requirements of tables I through III. However, conformance to these requirements shall not be construed as justification for failure to meet other requirements of this specification.

3.3.1 Potability. The contractor shall provide certification to the following potability requirements. The finished fabric tank shall contain no materials or substances that might leach out or deteriorate and cause the water to become non-potable. Materials shall have no adverse effect on the health of personnel when used for intended purposes. All surfaces that come in contact with potable water shall be in accordance with the Code of Federal Regulations (CFR), Title 21 - Food and Drugs, Part 177, less sections 177.1020 through 177.1050 and 177.1480 or shall be tested or listed as approved for use with potable water by the National Sanitation Foundation (NSF), Underwriters Laboratory, or the Safe Water Additives Institute in accordance with NSF Standard 61.

3.3.2 Material deterioration prevention and control. The contractor shall certify that each component of the tank assembly is fabricated from compatible materials, inherently corrosion resistant or treated to provide protection against various forms of corrosion or deterioration. The material shall withstand an operating temperature range of 32 °F to 130 °F, a relative humidity of 0 to 100 percent, and an ambient storage temperature range of -28 °F to 130 °F.

3.3.3 Recycled, recovered, or environmentally preferable materials. Recycled, recovered (see 6.5.1), or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds operational and maintenance requirements, and promotes economically advantageous life cycle costs. Used, rebuilt, or re-manufactured components, pieces, and parts shall not be incorporated in the panel sets (see 6.5.1).

3.3.4 Base Fabric. The cloth of the coated fabric shall be high-tenacity, and heat and light resistant. The cloth shall be free of any imperfection affecting strength, coating adhesion, coating thickness, or leakage.

3.3.5 Coated fabric. The coated fabric shall be free from blisters (see 6.5.2), holidays (see 6.5.3), or pinholes (see 6.5.4) and shall show no sign of coating delamination. The coated fabric shall meet or exceed the requirements of table I.

3.4 Tank construction. Coated fabric panels may be spliced together; however, all splices shall be located on the bottom of the tank. All splices shall conform to requirements for seams as specified in 3.4.1. Splices in adjacent panels shall not coincide. On both the interior and exterior of the tank, all edges of seams, fabric flanges of fittings, and splices shall be covered with a coating compound barrier to a thickness of not less than 10 mils. The inflation collar and float (if used) shall each have one deflation port. These ports shall be labeled with the word "DEFLATION". The inflation collar and float (if used) shall each have one air inflation valve (automotive type) labeled "INFLATION". These labels shall be stenciled in 1-inch high letters.

An enclosed buoyant material may be substituted for the inflation collar and float. Figure 1 is for reference only. A coating of talc shall be applied to the tank before being folded for shipment.

3.4.1 Seams. All tank seams including end closures, handle patches, and fabric flanges of fittings shall conform to the requirements of table II.

3.4.1.1 Lap joints and butt joints. Lap joints or butt joints shall be used to fabricate seams between adjacent panels and splices. Lap joints shall have a minimum overlap length of 2.00 inches. Lap joints shall have a coating compound barrier of not less than 10 mils centered over the inner and outer exposed coated fabric edge to prevent wicking through the fabric. Butt joints shall have a 2.00 inch (minimum) wide patch centered over the butted joint on both sides of the coated fabric.

3.4.2 Handles. The handle shall have a minimum inner opening radius of 4 inches. The patch and handle assembly shall be bonded to the tank and located at the side of the tank when filled to its rated capacity. Ten or more handles shall be equally spaced around the tank. A handle shall be placed in the center of the inside floor for suspending the tank inside-out. The bonds between each handle patch assembly and the tank fabric shall conform to the requirements of table II.

3.4.3 Fittings. The tank shall be furnished with one male and one female filler/discharge assembly positioned at ground level and 180 degrees from one another. The male filler/discharge assembly shall be 2 inches in size in accordance with ASTM F 1122 with a dust cap. The female filler/discharge assembly shall be 2 inches in size in accordance with ASTM F 1122 with a dust plug.

3.4.3.1 Reinforcing pad assembly. A reinforcing pad assembly shall be bonded into the coated fabric to support the filler/discharge assemblies. The bond shall meet the requirements of table III. The filler/discharge assemblies shall be securely attached to the tank, either by adhesive bonding, and/or reinforcing pad assembly, or fasteners or any combination thereof. Fasteners shall be suitable for use with potable water.

3.5 Tank performance. The tank and components shall withstand folded storage at ambient temperatures from -25 to 160 °F, at any relative humidity without damage or leakage when subsequently filled with water. The tank and components shall be suitable for operational use at ambient temperatures from 32 to 125 °F. The tank shall not be damaged during service life when exposed to fungi growth or relative humidity up to 100% such as is encountered in tropical climates. The tank shall be suitable for use in continuous contact with rainwater, well water, and ground water. There shall be no leakage or seepage when the tank is filled for 90 days to its rated capacity.

3.6 Valve assemblies. Two valve assemblies shall be provided with each tank. Each assembly shall consist of one 2-inch valve, one 2-inch male and one 2-inch female quick-disconnect coupling in accordance with ASTM F 1122, and one 2-inch dust cap and one 2-inch dust plug in accordance with ASTM F 1122.

3.7 Storage/carrying valise. The tank shall be furnished with a valise. The valise shall be used to carry the tank, pump, repair kit, protective cover, float, ground cloth, valve assemblies, and instructional manual. An encapsulated plastic instruction card, stating set-up and re-packing instructions, shall be attached to the inside of the valise flap. The valise shall have a service and

storage life equal to or greater than that of the tank. The valise shall be provided with the appropriate amount of handles to permit a four-soldier carry. The fully loaded valise shall be capable of being dropped from a height of 60.00 inches onto a hard surface without failure when tested as specified in 4.5.1.9. The bonds between each handle patch assembly and the valise fabric shall conform to table III requirements.

3.8 Tank weight. The tank, valise, repair kit, cover, float, pump (if used), and instruction manual shall have a total weight of not more than 140 pounds. The weight restriction does not include the valve assemblies and ground cloth (unless it is used as the valise.)

TABLE I. Characteristics of coated fabric.

Item	Test property	Requirements	Test methods		
			ASTM	AATCC	Para
1.	Tearing strength: (Warp & fill lb/in, min)	26	D 751 Proc B		4.5.1.10
2.	Breaking Strength: (Warp & fill, lb/in, min)	175	D 751		4.5.1.10
3.	Puncture resistance: (lb, min)	110	D 751		4.5.1.11
4.	Weather resistance: After 1500 hr exposure & 5% elongation, warp & fill: Breaking strength retention	80% (min)	D 2565 ¹	111 option A	-
5.	Low temperature crease resistance (Appearing after unfolding)	No cracking, peeling or delamination			4.5.1.12
6.	Blocking:	Separation to occur within 5 sec			4.5.1.13
7.	Coating adhesion: Initial, (lb/in, min) After immersion in water at 160 ±2 °F for the following durations: 14 days, (lb/in, min) 42 days, (lb/in, min)	20 15 12	D 751 D 471		4.5.1.14
8.	Ozone resistance	No cracks under 7X lens	D 1149		4.5.1.21

¹ Xenon light, procedure A, inner and outer borosilicate filters, deionized water (68 ±5° F); 690 minutes light exposure, 30 minutes light and gray, block panel temperature (145 ±5° F); relative humidity (45 ±5 %). Coated fabric specimens shall have exterior coating (outside of tank) facing the light.

TABLE II. Characteristics of seams.

Test property	Requirements	Test method	
		ASTM	Para
Breaking strength: Initial, (lb/in, min)	175	D 751	4.5.1.15
Breaking strength at 73 ± 5 °F After immersion in distilled water at 160 ± 2 °F for:		D 471 (15)	
14 days, (lb/in, min)	170		
42 days, (lb/in, min)	160		
Dead load shear resistance under 50 lb/in stress at 160 ± 2 °F for 8 hr:	0.1 in slippage (max)		4.5.1.16
Seam peel adhesion: Initial, (lb/in, min)	20	D 413 machine method	4.5.1.15
After immersion in water at 160 °F for:		D 413 machine method	
14 days, (lb/in, min)	15		
42 days, (lb/in, min)	12		
Handle seams pull test *	140		4.5.1.6

* Applies to seams between handles and tank, and handles and valise.

TABLE III. Characteristics of bonded reinforcing pad.

Test property	Requirements	Test method	
		ASTM	Para
Reinforcing pad to coated fabric bond strength:			4.5.1.17
Initial, (lb/in, min)	180	D 751	4.5.1.17.1
Bond strength 73 ± 5 °F after immersion in water at 160 ± 2 °F for:			4.5.1.17.2
14 days, (lb/in, min)	160	D 471 (16)	
42 days, (lb/in, min)	150		
Dead load shear resistance under 60 lb/in stress at 160 ± 2 °F for 8 hr:	0.10 inch slippage (max)		4.5.1.17.3

TABLE III. Characteristics of bonded reinforcing pad - Continued.

Test property	Requirement	Test method	
		ASTM	Para
Peel adhesion of reinforcing pad to coated fabric: Initial, (lb/in, min)	15	D 751	4.5.1.18
Peel adhesion at 75 ±5 °F after immersion in water at 160 ±2 °F for the following durations: 14 days, (lb/in, min)	11	D 471 (16)	
42 days, (lb/in, min)	9		

3.9 Taste and odor. The materials of the tank, cover, and float, that contact drinking water shall conform to APHA Standards and Methods for Examination of Water and Waste Water, parts for Taste (211B) and Odor (207). The material shall not impart odor to chlorinated water such that the threshold odor number exceeds 2. The material shall not impart taste to chlorinated water such that the taste rating scale exceeds 4.

3.10 Repair kit. A repair kit in accordance with PD-52255, Type II shall be provided with the tank.

3.11 Pump. A pump shall be provided for tanks designed with an inflatable collar and/or float. The pump shall incorporate a tire valve connector. The connector shall be designed to interface with standard 0.302-32 externally threaded automotive type tire valves with a leak proof seal. The pump shall be capable of conforming to the test specified in 4.5.1.8

3.12 Protective cover. A protective cover shall be provided with each tank.. The cover shall be constructed from the same coated fabric as the tank. All seams and exposed edges shall be sealed. The cover shall be supported to prevent the accumulation of precipitation on top of the cover when the tank and cover are deployed. If the support incorporates the use of an inflatable float, the float must conform to 3.4.

3.13 Ground cloth. A ground cloth shall be provided with each tank. The ground cloth shall be constructed from the same coated fabric as the tank. All seams and exposed edges shall be sealed. The emplaced ground cloth shall extend a minimum 6-inches beyond the edge of the tank when fillet to its rated capacity.

3.14 Identification marking. Identification marking of the tank shall provide the information listed in figure 2, and located as shown in figure 1, applicable to the particular tank product. The label shall be printed in 0.50 inch high, minimum, lettering of a contrasting color to the background, on the tank.

3.14.1 Tank. The tank shall be permanently marked "DRINKING WATER ONLY" in 4.00 inch high, uppercase lettering.

3.15 Stability. The filled tank shall be usable on slopes up to 10 percent (10 feet per 100 feet). When tested in accordance with 4.5.1.19, the tank shall not collapse, creep, or overturn.

3.16 Rework and repair. All rework or repair of seams shall not exceed 5 percent of the cumulative seam lengths of the tank. Total repair or rework on any seam shall not exceed the length of 5 percent of the length of that seam. Repair and rework of areas of the tank body fabric shall be limited to areas of damage of 3.00 inches (length, width or diameter) or less. All rework and repair procedures must be accomplished before quality conformance inspection and inspection of packing. The contractor shall make available to the contracting officer and government representative on site of manufacture a rework and repair procedure for use during production of the tanks (see 6.2). Any deviation from the procedure shall require the prior approval of the contracting officer.

4. VERIFICATION

4.1 Classification of inspections. Inspections shall be classified as follows:

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. When a first article inspection is required, it shall be performed on one complete tank. The inspection shall include the examination of 4.4 and the testing of 4.5 as defined in table V.

4.3 Conformance inspection.

4.3.1 Sampling. ANSI/ASQC Z1.4 shall be used to determine the lot size and random sampling for conformance inspection during production. Conformance inspection shall include the examination of 4.4 and the testing of 4.5, as defined in table V. The testing of 4.5 shall be conducted on a production tank selected at random for the lot with the following exception; coated fabric test samples may be taken from scraps used in the production of the lot.

4.4 Examination. The first article or production tank selected shall be examined as specified in table IV. Any nonconformance revealed by the examination shall be cause for rejection of the first article or corresponding lot.

TABLE IV. Examination Schedule.

Number	Examination Description	Requirement Paragraph
101.	Potability requirements not as specified. *	3.3.1
102.	Material deterioration, prevention and control requirements not as specified. *	3.3.2
103.	Base fabric not as specified. *	3.3.4
104.	Panels and splices not as specified.	3.4
105.	Inflation collar and float not as specified.	3.4
106.	Joints not as specified.	3.4.1.1
107.	Inner radius, quantity, and location of handles not as specified.	3.4.2
108.	Fittings not as specified. *	3.4.3

TABLE IV. Examination Schedule - Continued.

Number	Examination Description	Requirement Paragraph
109.	Valve assemblies not as specified. *	3.6
110.	Instruction card and handles of the valise not as specified.	3.7
111.	Repair kit not as specified. *	3.9
112.	The pump valve connector not as specified.	3.11
113.	Protective cover not as specified.	3.12
114.	Ground cloth not as specified.	3.13
115.	Identification marking not as specified.	3.14
116.	Tank not marked as specified.	3.14.1
117.	Rework and repair not as specified.	3.16

* Contractor letter of certification to this requirement is acceptable.

TABLE V. Test schedule.

First article	Quality conformance	Test	Test Paragraph	Requirement Paragraph
	Sample			
		<u>Tank and accessories</u>		
X	X	Weight.	4.5.1.1	3.8
X	X	Air-leakage (if inflatable components are used).	4.5.1.2	3.1
X	-	Low temperature.	4.5.1.3	3.5
X	-	Taste and Odor.	4.5.1.20	3.9
X	-	High temperature.	4.5.1.4	3.5
X	-	Water storage.	4.5.1.5	3.1
X	-	Handle pull test.	4.5.1.6	table II
X	-	Internal inspection.	4.5.1.7	3.3.5
X	-	Pump.	4.5.1.8	3.11
X	X	Storage/carrying valise.	4.5.1.9	3.7
X	X	Stability.	4.5.1.19	3.15

TABLE V. Test schedule - Continued.

First article	Quality conformance	Test	Test Paragraph	Requirement Paragraph
	Sample			
		<u>Coated fabric</u>		
X	X	Tearing strength.	4.5.1.10	3.3.5 & table I
X	X	Breaking Strength.	4.5.1.10	3.3.5 & table I
X	-	Weather resistance.	4.5.1.10	3.3.5 & table I
X	X	Puncture resistance.	4.5.1.10 & 11	3.3.5 & table I
X	-	Low temperature crease resistance.	4.5.1.10	3.3.5 & table I
X	-	Blocking	4.5.1.10	3.3.5 & table I
X	-	Coating adhesion, initial	4.5.1.10 & 14	3.3.5 & table I
X	-	Coating adhesion after 14 day water immersion.	4.5.1.10	3.3.5 & table I
X	-	Coating adhesion after 42 day water immersion.	4.5.1.10	3.3.5 & table I
X	-	Ozone resistance.	4.5.1.10 & 21	3.3.5 & table I
		<u>Seams</u>		
X	-	Breaking strength, initial.	4.5.1.15	3.4.1 & table II
X	-	Breaking strength after 14 day water immersion.	4.5.1.15	3.4.1 & table II
X	-	Breaking strength after 42 day water immersion.	4.5.1.15	3.4.1 & table II
X	-	Dead load shear resistance.	4.5.1.15 & 16	3.4.1 & table II
X	-	Peel adhesion, initial.	4.5.1.15	3.4.1 & table II
X	-	Peel adhesion after 14 day water immersion.	4.5.1.15	3.4.1 & table II
X	-	Peel adhesion after 42 day water immersion.	4.5.1.15	3.4.1 & table II
		<u>Bonded reinforcing pad</u>		
X	-	Bond strength, initial.	4.5.1.17.1	3.4.3.1, table III
X	-	Bond strength after 14 day water immersion.	4.5.1.17.2	3.4.3.1, table III
X	-	Bond strength after 42 day water immersion.	4.5.1.17.2	3.4.3.1, table III
X	-	Dead load shear resistance.	4.5.1.17.3	3.4.3.1, table III
X	-	Peel adhesion, initial.	4.5.1.18	3.4.3.1, table III
X	-	Peel adhesion after 14 day water immersion.	4.5.1.18	3.4.3.1, table III
X	-	Peel adhesion after 42 day water immersion.	4.5.1.18	3.4.3.1, table III

4.5 Inspection procedure.

4.5.1 Tests.

4.5.1.1 Tank and accessory weight. Weigh the tank, cover, valise, instruction manual, and repair kit, with bellows and float if applicable, for compliance with 3.8. Inability to meet the weight requirement shall constitute failure of this test.

4.5.1.2 Air-leakage. If the tank collar or cover float are inflatables, they shall be tested to demonstrate their capability to hold air, to 3 psi, without leakage. Any failure or rupture shall constitute failure of this test.

4.5.1.3 Low temperature. The tank and accessories shall be placed in the storage/carrying valise and subjected to a low temperature environment of -28 ± 2 °F, for a period of 24 hours. The ambient temperature shall then be increased to -25 ± 2 °F, for an additional 24 hours. At the end of this period, while still at -25 ± 2 °F, the tank shall be slowly unfolded in not less than 15 nor more than 30 minutes. The tank shall be removed from the low temperature environment. The pump shall be used to inflate the collar and/or float (if required). The tank shall be filled with 3000 gallons of water. Any flaking, cracking, or separation of the coated fabric, failure of the pump, seepage or leakage shall constitute failure of this test.

4.5.1.4 High temperature. The tank and accessories shall be placed in the storage/carrying valise and subjected to a high temperature environment of 160 ± 2 °F, for a period of 24 hours. The ambient temperature shall then be decreased to 125 ± 2 °F for an additional 24 hours. At the end of this period, while still at 125 ± 2 °F, the tank shall be slowly unfolded in not less than 15 nor more than 30 minutes. The tank shall be removed from the high temperature environment. The pump shall be used to inflate the collar and/or float (if required). The tank shall be filled with 3000 gallons of water. Any flaking, cracking, or separation of the coated fabric, failure of the pump (if used), seepage or leakage shall constitute failure of this test.

4.5.1.5 Water storage. The tank, with cover, shall be filled with 3000 gallons of potable water through a filler/discharge assembly, allowed to stand for 30 days, and examined for seepage or leakage. Any seepage, leakage or failure of tank to contain the 3000 gallons of water shall constitute failure of this test.

4.5.1.6 Tank handle pull resistance. The test shall be performed on four of the ten handles, evenly spaced around the tank, as well as the suspension handle attached to the inside, bottom of the tank. Each handle shall be tested in accordance with the following procedure. The tank body fabric shall be tightly drawn and clamped between two flat rings, or a base plate and a ring, so that the handle is centrally located within the ring(s). The size and shape of the ring(s) shall be such that the edges of the handle mounting patch have a minimum clearance of 3.00 ± 1.00 inches from the inside of the ring(s). The rigidity, strength, and construction of the clamp shall be such that the tank body material shall not slip more than 0.50 inch during the test. With the tank wall held securely, tension shall be applied to the handle using a bar or pipe, approximately 1.00 inch in diameter, inserted in the loop of the handle. The tension shall be applied slowly and smoothly perpendicular to the plane of the handle patch, until a load of 140 pounds minimum is reached. The 140 pound minimum load shall be maintained for 1 minute minimum. Any damage,

permanent distortion, or separation of the handle patch or tank material shall constitute failure of the test.

4.5.1.7 Internal inspection. The tank shall be inspected internally. Any weakened areas or coating, barrier delamination, blisters, holidays, or pinholes shall constitute failure of this test.

4.5.1.8 Pump. The pump (if used) shall be cycled against a static head of 3 psi (minimum) for 10,000 cycles. Inability of the pump to develop a pressure of at least 3 psi per cycle over the 10,000 cycles shall constitute failure of this test.

4.5.1.9 Storage/carrying valise. The storage/carrying valise loaded with the tank and all accessories shall be dropped (3) times from a height of 60.00 ± 2.00 inches onto a hard surface. The valise and its contents shall be examined for failure. A failure is defined as a rip, tear, split or break in the fabric or seams or damage to contents. Three valise handles shall be tested using the procedures defined in 4.5.1.6. Nonconformance to 3.7 shall constitute failure of this test.

4.5.1.10 Coated fabric. Coated fabric properties shall be tested in accordance with test methods cited in table I. Unless otherwise specified (see 6.2), all samples shall be taken from the coated fabric used in the construction of the tank wall. Nonconformance to 3.3.5 and the requirements of table I shall constitute failure of this test.

4.5.1.11 Puncture resistance. ASTM D 3787 applies except that the ring clamp mechanism shall have an internal diameter of 3.00 inches, and the ball shall be replaced by a piercing instrument shaped like a flared, flat tip screwdriver, having a width of 0.312 ± 0.0004 inch at the extreme tip. The piercing tip edges shall be rounded to a 0.010-inch radius. The piercing instrument shall be oriented to intercept the warp and fill threads at an angle of approximately 45 degrees. The average of three test specimens shall be reported. Nonconformance to 3.3.5 and table I shall constitute failure of this test.

4.5.1.12 Low temperature crease resistance. Fold two specimens, each 8.00 inches square, in half in each direction so that a folded corner occurs in the center of each specimen. Place each folded specimen under a 4 pound load and condition at -28 ± 2 °F, for 46 hours. At the end of the conditioning period, raise the temperature to -25 ± 2 °F, unfold the specimens and examine visually. Signs of cracking, peeling or delamination of coating material shall constitute failure of this test.

4.5.1.13 Blocking. Place two coated fabric specimens 6.00 inches by 1.00 inch in an oven, on a smooth surface, in such a manner that the ends are overlapped 1.00 inch. Place a 4 pound weight directly on the overlapped area. After conditioning at a temperature of 160 ± 2 °F, for 4 hours, remove the weight and take the specimens from the oven and condition for 1 hour at 73 ± 5 °F. Attach one end of the specimen in a suitable clamping device allowing the free end to hang. Suspend a 4-ounce weight from the free end of the specimens. Inability of the strips to separate within 5 seconds under the 4-ounce load shall constitute failure of this test.

4.5.1.14 Coating adhesion. Sample of coated fabric shall be bonded face-to-face to provide specimens for determining adhesion between the cloth and exterior coating(s), between the cloth and interior coating(s), between laminations of interior coating(s) and barrier (if used), and between laminations of exterior coating(s). In forming this bond the specimens shall be

subjected to no heat or pressure greater than that normally encountered in curing the coating fabric, except for minimal pressure necessary to ensure contact while the bond is setting.

4.5.1.14.1 Test procedure. Adhesion shall be determined in accordance with ASTM D 751, except that the specimens shall be 2.00 inches wide. The specimens shall be of sufficient length to conduct adhesion tests for both initial values and after water immersions. The results obtained from each immersed specimen shall be compared with the initial adhesion of the same specimen to determine percentage of adhesion retained. Immersed specimens shall be conditioned in the test fluid at 73 ± 5 °F, for 30 to 90 minutes before testing. Testing of immersed specimens shall be completed within 3 minutes after removal from the conditioning fluid. Immersion of specimens shall be in accordance with ASTM D 471. Nonconformance to the requirements of table I shall constitute failure of this test. Any obvious bond failure evident after immersion but before stressing, even if the plane of failure is not sandwiched between the layers of fabric, shall constitute failure of this test.

4.5.1.15 Seam tests. The bonding together of any two or more pieces of coated fabric (such as lap joints, butt joints, closures, and coated fabric flanges of fittings) shall be considered seams and shall be subjected to all seam tests specified herein. The exception is chafing patches, which will only be tested for peel. The average breaking strength of five specimens for each type seam for each test shall be evaluated for conformance to requirements of table II. Breaking strength specimens shall be 2.00 inches wide (parallel to the seam) and shall extend (perpendicular to the seam) 3.00 inches beyond both edges of the seam. No part of the test specimens shall be coated or covered during the water immersion periods. Specimens shall be cooled in the immersion fluids at 73 ± 5 °F, for 30 to 90 minutes before testing. Testing of immersed specimens shall be completed within 3 minutes after removal from the immersion fluids. The average peel adhesion strength of three specimens for each type seam shall be evaluated for conformance to the requirements of table II. Peel adhesion specimens shall be of sufficient length to determine both the initial and after water adhesion values on the same specimen. If seam construction involves the use of binding thread, then the peel specimens shall be prepared with threads removed. Nonconformance to 3.4.1 and the requirements of table II shall constitute failure of this test.

4.5.1.16 Dead load shear resistance. The test specimens shall be 1.00 ± 0.02 inch wide, (parallel to the seam) and shall extend a minimum of 3.00 inches on each side of the seam. One index mark shall be scribed on each side of the seam to facilitate observation and measurements of slippage. Each specimen shall be subjected to a constant (dead load) tension force of 50 ± 5 pounds, at 160 ± 2 °F. After 8 hours examine each specimen, while still under tension, for signs of slippage or separation. Three specimens shall be tested for each determination. Separation or slippage, by any specimen, greater than specified in table II shall constitute failure of this test.

4.5.1.17 Strength of bonded reinforcing pad. Specimens shall be prepared by cutting through the assembly at an equal distance between screw holes and through center of screw holes so that wedge shape sections are obtained. These sections shall include at least 2.00 inches of the coated fabric beyond the edge of the reinforcing pad.

4.5.1.17.1 Initial bond strength. The coated fabric bonded to the reinforcing pad shall be fastened together in one jaw of the test machine so that the jaw will be at least 1.00 inch from the nearest part of the reinforcing pad. The reinforcing pad ring section shall be secured in the other jaw of the test machine and this jaw shall clamp only the ring and reinforcing pad. The jaws

shall be separated at a rate of 0.50 inch per minute at 73 ± 5 °F. The average of three test specimens shall be recorded as initial bond strength, in pounds per inch of width. To determine this value the sample width shall be the cord length at the point of failure. Nonconformance to 3.4.3.1 and the requirements of table III shall constitute failure of this test.

4.5.1.17.2 Bond strength after fluid immersion. Three test specimens shall be immersed for the appropriate time periods in each test fluid as specified in table III. No part of the specimens shall be covered or coated during immersion. The test specimens shall be cooled in the immersion fluid to 73 ± 5 °F, for up to 60 minutes. The specimens shall be removed from the test fluid, one at a time and tested as in 4.5.1.17.1. Each test shall be completed within 3 minutes after removal from the test fluid. The average of three tests for each fluid shall be reported as bond strength after immersion, in pounds per inch of width. Nonconformance to 3.4.3.1 and the requirements of table III shall constitute failure of this test.

4.5.1.17.3 Dead load shear resistance reinforcing pad to fabric bond. Specimens shall be prepared by cutting through the reinforcing pad where it is bonded to the tank floor so as to produce 1.00 inch wide parallel specimens. These sections shall include at least 3.00 inches of coated fabric beyond the edge of the reinforcing pad. Three specimens shall be clamped as in 4.5.1.17.1 and subjected to a constant (dead load) tension force of 50 pounds at 160 ± 2 °F. At the end of 8 hours, the specimens shall be examined for slippage or separation while under tension. Nonconformance to 3.4.3.1 and the requirements of table III shall constitute failure of this test.

4.5.1.18 Peel adhesion of reinforced pad to coated fabric. Specimens shall be prepared by cutting a 2.00 inch wide strip through the ring assembly extending into the coated fabric. These specimens shall include at least 2.00 inches of the coated fabric beyond the edge of the reinforcing pad.

4.5.1.18.1 Test procedures. Specimens shall be tested as per ASTM D 413, machine method, strip specimen type A. Separate single specimens shall be used to determine initial peel strength and peel strength after fluid immersion. The same specimens shall be used to compute the percentage of initial adhesion retained. Nonconformance to the requirements of table III shall constitute failure of this test.

4.5.1.19 Stability. The tank shall be deployed with cover on a 10 percent slope and filled to rated capacity with water. The tank shall be allowed to stand for a minimum of 24 hours. Nonconformance to 3.15 shall constitute failure of this test. At the conclusion of 24 hours, the tank shall be examined for seepage and leakage. Any seepage or leakage of the tank shall constitute failure of this test.

4.5.1.20 Taste and odor. Samples of cured coating compounds shall be immersed for 72 ± 2 hours in distilled water having a 0.2 parts per million of total available chlorine at the start of the test. The samples shall be large enough to expose 50 square centimeters of compound to one liter of chlorinated distilled water. The water shall be tested for taste and odor in accordance with procedures outlined in APHA Standard Methods for the Examination of Water and Wastewater, Parts 207 Odor, and 211B Taste rating scale. Nonconformance to 3.9 shall constitute a failure of this test.

4.5.1.21 Ozone resistance. Test according to ASTM D 1149, specimen B. Test specimen shall be conditioned for 7 days at 104 ± 4 °F having a partial pressure of ozone of 50 millipascals. Nonconformance to table I shall constitute failure of this test.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The tanks are intended for use as a potable water storage container when quick storage facilities are needed and where permanent potable water storage facilities are not available, or when the storage of potable water is only on a temporary basis.

6.2 Acquisition requirements. Acquisition documents will specify the following:

- a. Title, number, and date of this publication
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2 and 2.3)
- c. When a first article is not required or the time frame for submission of the first article (see 3.2 and 4.2)
- d. The color required (see 3.1).
- e. When samples shall not be taken from the coated fabric used in the construction of the tank wall (see 4.5.1.10).
- f. Level of packing required (see Section 5).

6.3 Data Requirements. The contracting officer should include requirements for such data as technical publications, instructional materials, illustrated parts lists, and the contractor's maintenance and operation manuals to be furnished with each tank.

6.4 First article. When a first article inspection is required, the item(s) should be initial production models. The first article should consist of two units, one of which will be used in destructive testing. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of the first article test results and disposition of the first articles. Solicitations should provide that the Government reserves the right to waive the requirement for first article inspection to those bidders offering a product that has been previously acquired or tested by the Government; and that bidders offering such products, who wish to rely on such a production or test, must furnish evidence with the bid or

proposal that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternative bids unless specifically requested to do so in the solicitation.

6.5 Definitions. The following definitions apply for this specification.

6.5.1 Recovered materials. Recovered materials are those that have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished from virgin raw materials.

6.5.2 Blister. A blister is a void or hole causing a protrusion on the coated fabric surface when hot. It may not show when cold, and may be covered or open.

6.5.3 Holiday. A holiday is a area in the coated fabric not covered by coating compound.

6.5.4 Pinhole. A pinhole is a minute, circular void or a solvent blow hole.

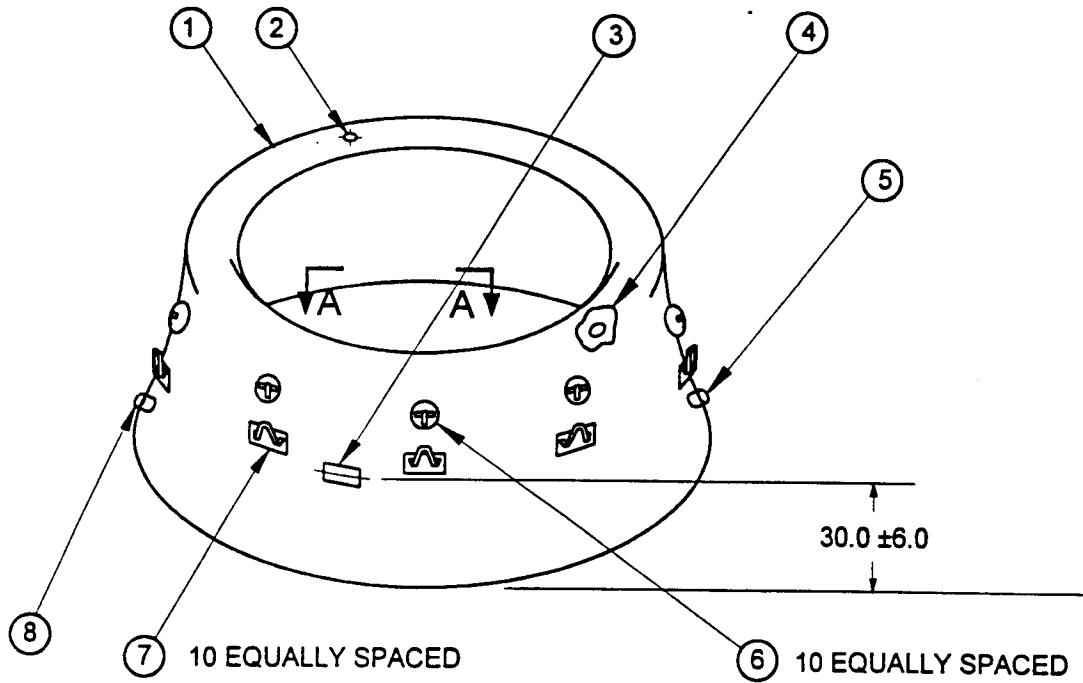
6.6 Subject term (key word) listing.

Bag

Bladder

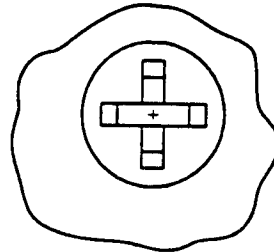
Container

Potable water



NOTES:

1. ALL DIMENSIONS ARE IN INCHES.
2. OPTIONAL DESIGN HANDLES MAY BE USED AS FASTENER FOR COVER.
3. THIS FIGURE IS PROVIDED FOR REFERENCE ONLY. THE LOCATION OF THE ITEMS SHALL CONFORM TO THE CONTRACTORS DESIGN.



VIEW A-A

Item	Description	Qty.
1	Inflation Collar (if used)	1
2	Deflate Port (if used)	1
3	Identification marking	1
4	Schrader Valve, Automotive Type (if used)	1
5	Male Filler/Discharge Assembly	1
6	Fastener	10
7	Handle	10
8	Female Filler/Discharge Assembly	1

FIGURE 1. Open top, self-supporting, collapsible, fabric, water storage tank 3K gal. - Example.

TANK, FABRIC, SELF-SUPPORTING

3000 U S GALLONS, WATER

NSN: (Specify)

SERIAL NO: (Specify)

MFR: (Manufacturer's name and location of plant)

WEIGHT EMPTY: (Specify number of pounds)

CONTRACT OR ORDER NO: (Specify)

LOT: (Specify)

DATE OF MANUFACTURE: (Specify month and year)

FIGURE 2. Tank and valise identification marking information.

PD-53048

Preparing activity for this performance specification is: The U.S. Army Tank-Automotive and Armaments Command, Mobility Technology Center, Fort Belvoir, VA 22060-5843.

Custodian:

Army - TA

Navy - YD

Preparing activity:

Army - TA

Review activities:

Navy - YD